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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]About the image forming device which used the electrophotographing system, this invention relates to the electro photography image forming device which makes it transfer further and obtains an image formed matter, after making the toner image especially formed on the 1st picture support once transfer on an intermediate transfer body.

[0002]

[Description of the Prior Art]A color image forming device and a multi-colored picture image formation device which output the image formed matter which the image forming device which uses an intermediate transfer body carried out lamination transfer of two or more ingredient color images of color image information or multi-colored picture image information one by one, and carried out synthetic reappearance of a color picture or the multi-colored picture image, Or it is effective as an image forming device which made color picture molding machine ability and a multi-colored picture image formation function provide.

[0003]the roller geometry in which the intermediate transfer body used for this invention has an elastic layer which comes from rubber, an elastomer, or resin at least on belt shape and a conductive substrate, for example -- further, The roller geometry which has an enveloping layer of one or more layers, and various modes are chosen as the upper layer of the elastic layer the purpose and if needed. That is, when the miniaturization of an image forming device is required, the belt shape where the flexibility of shape is high is mainly used, and the drum shape which is excellent in the rigidity of an intermediate transfer body is mainly used to acquire easily the picture which each ingredient color image makes it pile each other up, and shifts with a color image forming device (color shift) and which is not.

[0004]Although the following is explanation about an intermediate transfer belt, shape is not what was restricted to this. The schematic diagram of an example of the image forming device

using an intermediate transfer belt is shown in drawing 1.

[0005]Drawing 1 is a color image forming device (a copying machine or a laser beam printer) using an electrophotography process. The elastic body of middle resistance is used for the intermediate transfer belt 20.

[0006]1 is a rotating-drum type electro photography photo conductor (it is described as a photoconductive drum below) by which repeated use is carried out as 1st picture support, and is rotated with the predetermined peripheral velocity (process speed) of an arrow clockwise.

[0007]The photoconductive drum 1 is a rotation process and charging processing is uniformly carried out to predetermined polarity and potential by the primary electrifying device 2, subsequently, the unillustrated image exposure means 3 (color separation and the image formation exposure optical system of a color copy picture.) The electrostatic latent image corresponding to the 1st color component image (for example, yellow color component image) of the target color picture is formed by receiving the image exposure by the scanning exposure system by the laser scanner which outputs the laser beam modulated corresponding to the time series electrical-and-electric-equipment digital pixel signal of picture information, etc.

[0008]Subsequently, the electrostatic latent image is developed with the 1st development counter (yellow color development counter 41) by the yellow toner Y which is the 1st color. At this time, each development counter of the 2nd - the 4th development counter (the magenta color development counter 42, the cyan color development counter 43, and the black color development counter 44) is come by off [operation-], and does not act on the photoconductive drum 1, and the yellow toner picture of the 1st color of the above is not influenced with the above 2nd - the 4th development counter.

[0009]The intermediate transfer belt 20 is clockwise rotated with the same peripheral velocity as the photoconductive drum 1.

[0010]The yellow toner picture of the 1st color of the above by which formation support was carried out on the photoconductive drum 1 in the process in which the nip part of the photoconductive drum 1 and the intermediate transfer belt 20 is passed. Intermediate transfer (primary transfer) is carried out one by one to the peripheral face of the intermediate transfer belt 20 by the electric field formed of the primary transfer bias impressed to the intermediate transfer belt 20 from the primary transfer roller 62.

[0011]The surface of the photoconductive drum 1 which finished transfer of the yellow toner picture of the 1st color corresponding to the intermediate transfer belt 20 is cleaned by the cleaning device 13.

[0012]Hereafter, in a similar manner, the magenta toner picture of the 2nd color, the cyanogen toner image of the 3rd color, and the black toner picture of the 4th color pile up, and are transferred on the intermediate transfer belt 20, one by one, and the synthetic color toner image corresponding to the target color picture is formed.

[0013]63 is a secondary transfer roller, and it corresponds to the secondary transfer counter rollers 64, and a bearing is carried out in parallel, and it is allocated in the state where it can estrange in the undersurface part of the intermediate transfer belt 20.

[0014]The primary transfer bias for sequential superposition transfer of the 1st - the toner image of the 4th color from the photoconductive drum 1 to the intermediate transfer belt 20 is impressed from the bias power supply 29 with reverse polarity (+) with a toner. The range of the impressed electromotive force is +100V-+5kV.

[0015]In the 1st - the primary transfer process of the toner image of the 3rd color from the photoconductive drum 1 to the intermediate transfer belt 20, the secondary transfer roller 63 and the charge members 8 for cleaning can also be estranged from the intermediate transfer belt 20.

[0016]The transfer to the transfer material P which is the 2nd picture support of the synthetic color toner image transferred on the intermediate transfer belt 20, The secondary transfer roller 63 is contacted by the intermediate transfer belt 20, and the contact nip of the intermediate transfer belt 20 and the secondary transfer roller 63 is fed with the transfer material P from the feed roller 11 to predetermined timing, and secondary transfer bias is impressed to the secondary transfer roller 63 from the bias power supply 28. A synthetic color toner image is transferred by this secondary transfer bias from the intermediate transfer belt 20 to the transfer material P which is the 2nd picture support (secondary transfer). Heat fixing of the transfer material P which received transfer of the toner image is introduced and carried out to the fixing assembly 15.

[0017]By the charge members 8 for cleaning being contacted by the intermediate transfer belt 20 after image transfer ending to the transfer material P, and impressing the bias of reverse polarity in the photoconductive drum 1, The electric charge of the photoconductive drum 1 and reverse polarity is given to the toner (transfer residual toner) which remains on the intermediate transfer belt 20 without being transferred by the transfer material P.

[0018]When said transfer residual toner is electrostatically transferred by the photoconductive drum 1 [a nip part and near / its / the photoconductive drum 1], an intermediate transfer body is cleaned.

[0019]The color electrophotography device which has an image forming device using the above-mentioned intermediate transfer belt, A color electrophotography device with the image forming device which is made to stick or adsorb on the transfer drum which is a Prior art, and transfers a picture from on the 1st picture support there, For example, as compared with a transfer device which was described in JP,63-301960,A. Since a picture can be transferred from an intermediate transfer belt, without needing at all processing and control (for example, stick [which is carried out at the time of a bundle] to a gripper, and curvature is given to it) for the transfer material which is the 2nd picture support, Papers (40 g/m² paper), such as an

envelope, a postcard, and a label paper, to thin thick paper (200 g/m² paper) is not based on extensive ** of width, the merits and demerits of length, or the thickness of thickness, but it has the advantage that the 2nd picture support can be chosen variously.

[0020]In a commercial scene, the color copying machine using an intermediate transfer belt, a color printer, etc. are already beginning to work for such an advantage.

[0021]In the image forming device of drawing 1, the transfer residue developer on the intermediate transfer belt 20 by which it was generated at the last image formation step may be returned to the photoconductive drum 1 at the same time it transfers the primary developer from the photoconductive drum 1 to the intermediate transfer belt 20 (a primary transfer simultaneous cleaning system is called henceforth). Since a primary transfer simultaneous cleaning system in particular does not need a cleaning step, it has the advantage that there is no fall of a throughput.

[0022]

[Problem(s) to be Solved by the Invention]However, are these color electrophotography devices functioning as a device which is expected truly to a user and gives satisfaction fully taking advantage of the aforementioned advantage? It is no.

[0023]When actually carrying out repeated use of the image forming device using this intermediate transfer body, it still has a problem which should be conquered as following.

[0024]In order to give a toner mold-release characteristic to an intermediate transfer body, when mixing a high lubricity filler to a surface layer, can give mold-release characteristic sufficient by mixing the content in 40-200 copies and a large quantity by a weight ratio to the binder solid content of a surface layer, but. At the time of the early stages of a generating picture, since the high lubricity filler has not appeared on the surface enough, sufficient mold-release characteristic is hard to be acquired. Therefore, the surface needed to be ground in order to acquire a surface state equivalent to the time of outputting a picture in large quantities and being able to delete the surface slightly, at i.e., the time of a high lubricity filler fully appearing on the surface. For this reason, polish cost might be needed and it might become what has the high cost of an intermediate transfer body. When an elastic layer is used for the bottom of the heap in case an intermediate transfer body has a layer more than two-layer, and the coating layer by coating is formed in the surface of an elastic layer, coating of the 1st coating layer will be directly carried out on an elastic layer, but. It is hard to separate minute garbage and BUTSU from an elastic body, and the elastic layer may fully be unable to remove minute garbage or BUTSU for cleaning thoroughly as a line, when minute garbage and BUTSU adhere from the character of the elastic body. After this minute garbage and BUTSU have adhered, if coating of the paint is carried out, minute garbage and BUTSU will be used as a core, An about several millimeters non-coating portion and what is called HAJIKI may occur from 10 micrometers of diameter numbers, and the part which this HAJIKI generated will be in

the state where an elastic layer is no longer covered in paints, and the natural complexion of an elastic layer can be seen. If a defect called HAJIKI occurs in the beginning even if it recoats a coating layer further on this, that part will be in the state where it is not fully recoated. Since the HAJIKI portion is in the state where it saw and dented from the surface compared with other good coating portions, as a problem generated in this, The portion which cannot take sufficient transfer electric field for moving a toner, and is not transferred because the distance from picture support becomes far as a transfer face, and what is called a white omission may be made. Since transfer efficiency from the transfer efficiency of the 1st picture support, for example, the intermediate transfer body from a photoconductive drum, and an intermediate transfer body to the 2nd picture support, for example, paper, and OHP sheet is made high, may set up transfer bias highly, but. When transfer bias is made high, superfluous current flows from the HAJIKI portion of an intermediate transfer body and the voltage impressed to the intermediate transfer body descends, The portion which sufficient transfer electric field for moving a toner is no longer obtained, and is not enough transferred by the HAJIKI portion, and what is called a white omission might be made, and it might become a picture with a defect. When an excess current flowed, there was fear, such as producing malfunction and breakage of the electric control system of an electrophotography device. Since the intermediate transfer body which the HAJIKI portion generated is as unsuitable as a product when an intermediate transfer body is produced by this, The actual condition is that the yield will get worse, will become what has the high cost of an intermediate transfer body, the price of a final product will be pushed up highly, and the color electrophotography device generally has not yet spread. [0025] This invention proposes the image forming device using the intermediate transfer body which solved the above-mentioned problem.

[0026] Namely, in that in which the lamination of an intermediate transfer body has a coating layer more than two-layer [which was formed of coating on the coating layer or elastic layer formed of coating on the elastic layer at least], That the toner quantity mold-release characteristic of the surface layer of an initial state is acquired, and when HAJIKI does not occur in the coating layer by which coating is directly carried out on an elastic layer, By the intermediate transfer body which has a high toner mold-release characteristic being obtained from an initial state, without grinding the surface, and also the layer by which coating is carried out being applied uniformly and a uniform film surface being acquired eventually. In order to raise the transfer efficiency in the case of carrying out that a picture white omission does not occur at the time of transfer or transfer to an intermediate transfer body from the 1st picture support, and transfer to the 2nd picture support from an intermediate transfer body, even when transfer bias is set up highly, the image forming device which leak does not generate is provided.

[0027]

[Means for Solving the Problem] In an image forming device further transferred on the 2nd picture support after the above-mentioned technical problem transfers a picture formed on the 1st picture support on an intermediate transfer body, It is solved by an image forming device containing a straight-chain-shape silicon compound which has the structure where this intermediate transfer body has a layer more than two-layer, and have the coating layer formed of coating on the bottom of the heap of the layers more than two-layer [this], and this coating layer is expressed with a following general formula (A) at least.

[0028]

[Formula 6]



(R₁ and R₂ express an alkyl group, may be respectively the same, or may differ from each other, and may have other arbitrary substituents in part.) n is a positive integer.

[0029] It is that the straight-chain-shape silicon compound contained in the paint shifts to a paint film surface by the surface activity in this invention, Non cohesiveness peculiar to silicon is acquired, and even if it is an initial state which the high lubricity filler has not exposed to the surface thoroughly, sufficient toner mold-release characteristic for an intermediate transfer body is acquired. By making the coating layer directly applied to the surface on an elastic layer contain a straight-chain-shape silicon compound as another effect, Though minute garbage and BUTSU have adhered to the elastic layer, because the surface tension of this paint for coating declines with a straight-chain-shape silicon compound. Become minute garbage, the surface tension of BUTSU, and below equivalent, they are prevented by the phenomenon which is dented in the shape of a crater and spreads focusing on minute garbage and BUTSU, and what is called HAJIKI, and by this. See from the surface, and the part in the state where it dented is lost, and a transfer face turns into an approximately uniform side, they are prevented by the portion which cannot take sufficient transfer electric field for moving a toner, and is not transferred, and what is called white omission, and further, Also in the case where transfer bias is highly set up in order to make high transfer efficiency from the transfer efficiency of the 1st picture support, for example, the intermediate transfer body from a photoconductive drum, and an intermediate transfer body to the 2nd picture support, for example, paper, and OHP sheet, When the portion into which superfluous current flows because the transfer face of an intermediate transfer body turns into an approximately uniform side is lost and the voltage impressed to the intermediate transfer body descends, The white omission by sufficient transfer electric field for moving a toner no longer being obtained is prevented, and also the malfunction and breakage of the electric control system of an electrophotography device by an

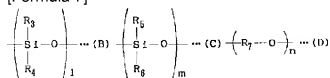
excess current flowing can be prevented.

[0030]Shift to a paint film surface by surface activity which is the feature of the above-mentioned straight-chain-shape silicon compound, Even if a straight-chain-shape silicon compound contains only in a coating layer directly applied to the bottom of the heap of a coating layer more than two-layer and a straight-chain-shape silicon compound does not contain in the outermost surface, Since a straight-chain-shape silicon compound shifts to the outermost surface when coating is completed eventually, a toner mold-release characteristic can be acquired only by making only the bottom of the heap contain.

[0031]What has the structure which combined two or more sorts in a following general formula (B), (C), and (D) at least as a straight-chain-shape silicon compound, for example is preferred.

[0032]

[Formula 7]



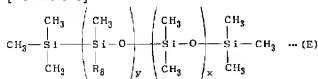
(R₃, R₄, R₅, R₆, and R₇ express an alkyl group, may be respectively the same, or may differ from each other, and may have other arbitrary substituents in part.) l, m, and n are positive integers.

[0033]Here, as a compound which has the structure of a general formula (B), (C), and (D), dimethylpolysiloxane, a methyl alkyl polysiloxane, and a polyether denaturation methyl alkyl polysiloxane are preferred respectively.

[0034]As a straight-chain-shape silicon compound which has said structure which combined two or more sorts in a following general formula (B), (C), and (D) at least, organic denaturation dimethylpolysiloxane expressed with a following general formula (E) is preferred.

[0035]

[Formula 8]

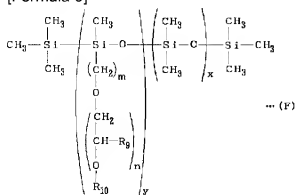


(R₈ expresses the organic group chosen from an alkyl group, an aralkyl group, and a polyester group.) x and y are positive integers.

[0036]As organic denaturation dimethylpolysiloxane expressed with said general formula (E), the polyether denaturation dimethylpolysiloxane expressed with a following general formula (F) is preferred.

[0037]

[Formula 9]

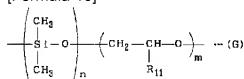


(R₉ expresses H or CH₃ and R₁₀ expresses an alkyl group, and it may be respectively the same, or may differ, and may have other arbitrary substituents in part.) x, y, n, and m are positive integers.

[0038]As a straight-chain-shape silicon compound which has said structure which combined two or more sorts in a following general formula (B), (C), and (D) at least, a dimethylpolysiloxane polyalkylene oxide copolymer expressed with a following general formula (G) is preferred.

[0039]

[Formula 10]



(R₁₁ expresses H or CH₃.) n and m are positive integers.

[0040]These straight-chain-shape silicon compounds can be chosen with the purpose of effects other than the improvement in a toner mold-release characteristic, or HAJIKI prevention, for example, the improvement in antifoaming, and leveling disposition superiors, and compatibility with the binder used. For example, when polyether denaturation dimethylpolysiloxane and a dimethylpolysiloxane polyoxyalkylene copolymer are used for the high viscosity paint which foams easily in order for antifoam to also improve with HAJIKI prevention, they can also stop a defect with a bubble at the time of coating, and are still more preferred.

[0041]It is preferred that it is less than 5 % of the weight of 0.001 % of the weight or more as an addition of a straight-chain-shape silicon compound to the solid content of the paint binder of the coating layer which adds this straight-chain-shape silicon compound. It is for a straight-chain-shape silicon compound's carrying out bleeding to a paint film surface so much, and

becoming easy to pollute a photo conductor etc., if the effect of the improvement in a toner mold-release characteristic or HAJIKI prevention becomes is it hard to be acquired to be less than 0.001 % of the weight and it becomes more than 5% weight.

[0042]As a binder used for a coating layer, for example Polyurethane resin, Polystyrene, chloropolystyrene, Polly alpha-methylstyrene, a styrene butadiene copolymer, A styrene vinyl chloride copolymer, a styrene vinyl acetate copolymer, a styrene maleic acid copolymer, a styrene acrylic ester copolymer (a styrene methyl acrylate copolymer.) A styrene ethyl acrylate copolymer, a styrene butyl acrylate copolymer, A styrene acrylic acid octyl copolymer, a styrene acrylic acid phenyl copolymer, etc., a styrene methacrylic-acid-ester copolymer (a styrene methyl methacrylate copolymer.) A styrene ethyl methacrylate copolymer, a styrene methacrylic acid phenyl copolymer, etc., Styrene resin, such as a styrene alpha-Krol methyl acrylate copolymer and a styrene acrylonitrile acrylic ester copolymer (a single polymer or a copolymer containing styrene or a styrene substitution product), Vinyl chloride resin, a styrene vinyl acetate copolymer, rosin denaturation maleic acid resin, phenol resin, an epoxy resin, polyester resin, low molecular weight polyethylene, low molecular weight polypropylene, ionomer resin, Resin, such as silicone resin, ketone resin, an ethylene-ethyl acrylate copolymer, xylene resin, a fluoro-resin, polycarbonate, polyamide resin, polyvinyl butyral resin and these copolymers, and a mixture, is mentioned. Urethane rubber, a styrene butadiene rubber, high styrene rubber, Rubbers, such as butadiene rubber, polyisoprene rubber, ethylene propylene rubber, nitril butadiene rubber, chloroprene rubber, isobutylene isoprene rubber, silicone rubber, fluorocarbon rubber, nitrile rubber, acrylic rubber, epichlorohydrin rubber, and polynorbornene rubber, can be mentioned.

[0043]Resin, rubber, and an elastomer of a urethane system are preferred from excelling in endurance. Coating methods of a coating layer using these binders include what is depended on a spray coating method, a thing to depend on a dipping method, a thing to depend on the roll coat method, a thing to depend on brush painting, etc.

[0044]Although the following is mentioned, for example as a high resistance quantity lubricity granular material which raises transfer efficiency of an intermediate transfer body used for this invention, it is not necessarily limited to these.

[0045]A granular material of a fluorine compound like resin, such as PTFE, PVDF, ETFE, and PFA, they are inorganic powder, such as a granular material of silicone series, such as silicone resin particles, silicone rubber, and a silicone elastomer, silica, alumina, titanium oxide, magnesium oxide, tin oxide, and iron oxide, etc. -- these -- it can also be used, being able to be independent or mixing more than one. When dispersibility and surface nature of that in which in particular shape or particle diameter of a high lubricity granular material are not limited, either, a globular shape, fibrous, tabular, an unfixed type, etc. can be used in any shape if lubricity is obtained, and restriction does not have particle diameter, either are taken

into consideration, the range of 0.02-50 micrometers is preferred. A surface treatment may be performed to these granular materials in the range which does not check lubricity if needed. It is preferred that it is 40 to 200 % of the weight as an addition of a high lubricity granular material to solid content of a paint binder of a coating layer which adds this high lubricity granular material. A dispersing agent can also be used in the range which does not give a problem to various characteristics.

[0046]A conducting agent may be added in order to adjust resistance of an intermediate transfer body used for this invention. Although not limited especially as a conducting agent, for example Carbon, Metallic oxides, such as metal powder, such as aluminum and nickel, and titanium oxide, Quarternary-ammonium-salt content poly methyl methacrylate, polyvinyl aniline, One kind chosen from a group which consists of conductive polymer compounds, such as polyvinyl pyrrole, polydiacetylene, polyethyleneimine, a boron-bearing highly polymerized compound, and polypyrrole, etc., or two kinds or more can be used. However, it is not limited to the above-mentioned conducting agent.

[0047]An intermediate transfer body used for this invention is except belt shape, for example, at least on a cylindrical conductive substrate Rubber, Roller geometry which has an elastic layer which consists of an elastomer or resin, and roller geometry which has an enveloping layer of one or more layers in the upper layer of the elastic layer further can also be chosen if needed.

[0048]As a cylindrical conductive substrate, can use conductive resin etc. which distributed metal and alloys, such as aluminum, iron, copper, and stainless steel, carbon, metal particles, etc., and as the shape, Cylindrical shape which was mentioned above, what penetrated an axis at the cylindrical center, a thing which reinforced inside cylindrical, etc. are mentioned.

[0049]Thickness of an intermediate transfer belt has the preferred one where it is possible thicker to drive this belt smoothly, and its thinner one is preferred unless a mechanical strength and pliability of this belt are spoiled. Specifically, 0.1-2 mm is preferred.

[0050]As for volume resistivity of an intermediate transfer body used for this invention, it is preferred that they are $10^{-1} - 10^{13}$ omega-cm, and it is especially preferred that they are $10^{-2} - 10^{10}$ omega-cm. As for volume resistivity of the 2nd [at least] layer, it is preferred that it is within the limits of these.

[0051]

[Example]Hereafter, an example is described.

[Example 1]

(Creation of the compound for elastic layers) SBR 33 weight section and 67 copies of EPDM (s), Vulcanizing agent (precipitated sulfur) 1.5 weight section, the amount part of vulcanizing assistant (flower of zinc) duplexs, rubber accelerator (MBT) 1 weight section, It mixed for 20 minutes, cooling rubber accelerator (TMTM) 1.2 weight section, conductive-carbon-black 24

weight section, stearic acid 1 weight section, and plasticizer (naphthene system process oil) 40 weight section with 2 rolls, and the compound was created.

[0052](Creation of a rubber belt) The rubber composition of the above-mentioned combination was uniformly twisted around the cylindrical metallic mold at 0.45 mm in thickness. Next, the polyamide thread (100 micrometers in diameter) which applied adhesives to the surface was spirally twisted in the pitch of 1.5 mm on said compound. The rubber composition of the above-mentioned combination moreover beforehand extruded to tube shape was put, vulcanization was performed at 150 °C for 50 minutes, and the resilient tube (φ140mm, 245 mm in length, and 0.9 mm in thickness) was obtained. Then, the tube surface was ground to 0.8 mm in thickness with the grinding stone, and the belt with little unevenness was obtained. Although the polish dregs which remained in the surface were cleaned with adhesive tape at this time, polish dregs were not able to be removed thoroughly.

[0053](Preparation of the paint for enveloping layers) Polyurethane prepolymer (specific gravity 1.13) 100 weight section, Dimethylpolysiloxane polyoxyethylene copolymer (straight-chain-shape silicon compound) 0.02 weight section, tetrafluoroethylene resin powder 75 weight section, distributed auxiliary agent 3.75 weight section, MEK 1309 weight section, and N-methyl-pyrrolidone 300 weight section were mixed, and the paint for enveloping layers was prepared.

[0054](Creation of an intermediate transfer body, and HAJIKI generation state check at the time of mass production) The rubber belt 202 was put on the metal cylinder 201 like drawing 2, and coating of the above-mentioned enveloping layer paint was carried out. The coating conditions at this time performed coating for 1 minute with this coating apparatus at 20-cc discharge quantity by the distance of 90 mm from a coating apparatus tip to a work, the work number of rotations of 120 rpm, coating apparatus lowering-speed 500 mm/min, and coating apparatus climbing-speed 2500 mm/min. The temperature of coating atmosphere was 22 °C and humidity was 45%RH. By heating after coating at 140 °C after 1-hour desiccation in the same atmosphere as coating atmosphere for 80 minutes, the residual solvent was removed and the intermediate transfer belt which has a 20-micrometer-thick tough enveloping layer was obtained. The resistance of the obtained intermediate transfer belt was $2.8 \times 10^8 \Omega$. Although this condition performed 1000 more coating, HAJIKI resulting from the garbage or BUTSU of a substratum was not seen by all 1000.

[0055](Imaging conditions)

color developer (four colors): -- primary one ingredient of nonmagnetic toner transfer voltage: -- +500V transfer voltage [secondary]: -- +1500V process speed: -- 120 mm/sec [0056]

(Evaluation of an intermediate transfer belt) Since it was a belt without the dent by HAJIKI when the full color electrophotography device shown in drawing 1 was equipped with this intermediate transfer belt and the full color image was printed on 80 g/m² paper, The good

picture without a white omission was acquired and the transfer efficiency (primary transfer efficiency is called henceforth) from a photoconductive drum to an intermediate transfer body was 97% and a good value by the release effect of the silicon system additive agent. When a 1000-sheet generating picture was carried out using this belt, transfer efficiency was the imaging quality which became 97%, was not different from an initial state, and was stabilized by grinding the surface slightly.

[0057][Example 2]

(Creation of the compound for elastic layers) It is the same as Example 1.

[0058](Creation of a rubber belt) It is the same as Example 1.

[0059](Preparation of the paint for the coating layer bottoms of the heap) Polyurethane prepolymer 80 weight section, Dimethylpolysiloxane polyoxyethylene copolymer (straight-chain-shape silicon compound) 0.02 weight section, MEK 1109 weight section, N-methylpyrrolidone 300 weight section, and cyclohexanone 200 weight section were mixed, and the paint for enveloping layers was prepared.

[0060](Preparation of the paint for the coating layer top layers) Polyurethane prepolymer 100 weight section, tetrafluoroethylene resin powder 75 weight section, distributed auxiliary agent 3.75 weight section, MEK 1309 weight section, and N-methylpyrrolidone 300 weight section were mixed, and the paint for enveloping layers was prepared.

[0061](Creation of an intermediate transfer body, and HAJIKI generation state check at the time of mass production) The rubber belt 202 was put on the metal cylinder 201 like drawing 2, and the above-mentioned paint for the bottoms of the heap was applied first. The coating conditions at this time are the distance of 90 mm from a coating apparatus tip to a work, the work number of rotations of 120 rpm, coating apparatus lowering-speed 500 mm/min, and coating apparatus climbing-speed 2500 mm/min, and performed coating by 10-cc discharge quantity for 1 minute with this coating apparatus. The temperature of coating atmosphere was 22 °C and humidity was 45%RH. The paint for the top layers as well as after 20-minute desiccation the paint for the bottoms of the heap performed coating on the bottom of the heap at 60 °C after coating. By drying at 60 °C after coating for 20 minutes, and heating for 80 minutes at back 140 °C which carried out leveling, the residual solvent was removed and the intermediate transfer belt which has a total of a 20-micrometer tough enveloping layer (bottom-of-the-heap 10 micrometers in thickness, and top layer 10 micrometers in thickness) was obtained. The resistance of the obtained intermediate transfer belt was $5.6 \times 10^8 \Omega$. Although this condition performed 1000 more coating, HAJIKI resulting from the garbage or BUTSU of an elastic layer was not seen by all 1000.

[0062](Imaging conditions) It is the same as Example 1.

[0063](Evaluation of an intermediate transfer belt) Since it was a belt without the dent by HAJIKI when the full color electrophotography device shown in drawing 1 was equipped with

this intermediate transfer belt and the full color image was printed on 80 g/m^2 paper, Although the good picture without a white omission was acquired, and primary transfer efficiency did not contain the silicon system additive agent in the top layer, since the silicon system additive agent contained in the bottom of the heap shifted to the surface and the release effect was acquired on the surface, they were 97% and a good value. When a 1000-sheet generating picture was carried out using this belt, transfer efficiency was the imaging quality which became 97%, was not different from an initial state, and was stabilized by grinding the surface slightly.

[0064][Comparative example 1]

(Creation of the compound for elastic layers) It is the same as Example 1.

[0065](Creation of a rubber belt) It is the same as Example 1.

[0066](Preparation of the paint for enveloping layers) Polyurethane prepolymer (specific gravity 1.13) 100 weight section, tetrafluoroethylene resin powder 75 weight section, distributed auxiliary agent 3.75 weight section, MEK 1309 weight section, and N-methyl-pyrrolidone 300 weight section were mixed, and the paint for enveloping layers was prepared.

[0067](Creation of an intermediate transfer body, and HAJIKI generation state check at the time of mass production) The rubber belt 202 was put on the metal cylinder 201 like drawing 2, and coating of the above-mentioned enveloping layer paint was carried out. The coating conditions at this time performed coating for 1 minute with this coating apparatus at 20-cc discharge quantity by the distance of 90 mm from a coating apparatus tip to a work, the work number of rotations of 120 rpm, coating apparatus lowering-speed 500 mm/min, and coating apparatus climbing-speed 2500 mm/min. The temperature of coating atmosphere was 22 °C and humidity was 45%RH. By heating after coating at 140 °C after 1-hour desiccation in the same atmosphere as coating atmosphere for 80 minutes, the residual solvent was removed and the intermediate transfer belt which has a 20-micrometer-thick tough enveloping layer was obtained. Observation of the surface of the obtained intermediate transfer belt looked at about three HAJIKI about 0.5 mm in diameter. Resistance was $2.8 \times 10^8 \Omega$. Although this condition performed 1000 more coating, 400 HAJIKI resulting from the garbage which remains in a substratum, or BUTSU occurred, and the yield got worse.

[0068](Imaging conditions) It is the same as Example 1.

[0069](Evaluation of an intermediate transfer belt) Since there was a dent by HAJIKI when the full color electrophotography device shown in drawing 1 was equipped with the intermediate transfer belt which this HAJIKI generated and the full color image was printed on 80 g/m^2 paper, The white omission corresponding to a HAJIKI part occurred, and it became a belt which cannot be shipped as a product. Primary transfer efficiency is 94% and fell compared with Examples 1 and 2. 2-3 micrometers of surfaces are ground for this intermediate transfer

belt with the abrasive paper of #1000, When the full color electrophotography device shown in drawing 1 was equipped and the full color image was printed on $80\text{g}/\text{m}^2$ paper, the primary transfer efficiency from a photoconductive drum to an intermediate transfer body was equivalent to 97% and Examples 1 and 2, but the cost by polish was size. When the belt of the same formula (however, with no polish) was created again and a 1000-sheet generating picture was carried out, transfer efficiency improved with 97% by the surface being ground slightly, but it became a different belt of transfer efficiency from an initial state, and became unstable in quality.

[0070]

[Effect of the Invention]As mentioned above, the coating layer formed of coating on the elastic layer of an intermediate transfer body is made to contain a straight-chain-shape silicon compound in this invention.

By therefore, the thing for which the transfer efficiency which is not different from the transfer efficiency in the state where the surface after early transfer efficiency's improving and carrying out a generating picture in large quantities was ground slightly is acquired from the first stage. The layer by which the intermediate transfer body of the stable quality can be obtained, and also a surface local dent is lost, and coating is carried out is applied uniformly, A uniform film surface is acquired eventually, and a picture white omission does not occur at the time of transfer, but The transfer to an intermediate transfer body from the 1st picture support, And since leak does not occur and also generating of a coating defect decreases substantially even when transfer bias is set up highly, in order to raise the transfer efficiency in the case of carrying out transfer to the 2nd picture support from an intermediate transfer body, the intermediate transfer body of low cost can be obtained.

[Translation done.]